

"Prediction of Wheat Yield in Gujarat from Temperature and Total Precipitation"

Submitted to Gujarat Agricultural University,
1978

K. Rama Varma Raja

Department of Agricultural Statistics, B. A.
College of Agriculture, Anand Campus, Anand

The dependence of Indian Agriculture on the vagaries of the monsoon had evinced considerable interest among agricultural meteorologists and as a result, the amount and distribution of it became a subject of extensive research for several decades. The importance of such a study is all the more relevant in a semi-arid State like Gujarat where the precipitation is confined to a short period of four months. Most of the kharif crops and some of rabi crops depend on their existence on the amount and frequency of this distribution. The temperature is also equally important for the growth and development of the crop. The study was taken up for predicting the wheat yield in Gujarat from temperatures and total rainfall which are the major constitute of climate. The data pertaining to temperatures, rainfall and yield of wheat for the area of Surat (1949-50 to 1975-76), Kaira (1951-52 to 1975-76) and Jamnagar (1949-50 to 1954-55 and 1962-63 to 1975-76) were collected and statistically analysed and the results so obtained are as under.

The increase in minimum temperature during the last week of milk to dough state (standard week number 9-11) increased the

yield. Similarly, during the tillering time (crown-root initiation to tillering stage i.e. standard week number 49-51) the crop was found to be favoured by increased temperatures, in the sense that during this stage when the average temperature ranged from 26 to 30° C in the three districts, an increase in maximum temperature was found to increase the yield. At the time of flowering, that is during the last week of jointing to flowering stage i.e. end of January, the increase in maximum temperature decreased the crop yield in the three districts indicating thereby that the crop, at this stage of the growth, welcomes cold weather. The formula for predicting the yield of wheat in Gujarat is as under:

$$Y_{si} = \sum_{j=1}^3 A_{ij} f_j$$

where,

i = refers to year,

j = refers to districts.

Y_{si} = estimated yield of wheat
in quintals/ha for the
State in the i^{th} year.

f_j = Weighting factor

$$A_{ij} = C_j + T_j + E_{ij}$$

Where

C_j = Constant term for j^{th}
district.

T_j = Trend term for the j^{th}
district.

E_{ij} = expected yields for the
district in the i^{th} year.